

We claim:

1. An isolated nucleic acid sequence which codes for a polypeptide having nitrilase activity, selected from the group of:
  - a) a nucleic acid sequence having the sequence depicted in SEQ ID NO: 1,
  - b) nucleic acid sequences which are derived from the nucleic acid sequence depicted in SEQ ID NO: 1 as a result of the degeneracy of the genetic code,
  - c) derivatives of the nucleic acid sequence depicted in SEQ ID NO: 1, which code for polypeptides having the amino acid sequences depicted in SEQ ID NO: 2 and have at least 95% homology at the amino acid level, with negligible reduction in the enzymatic action of the polypeptides.
2. An amino acid sequence encoded by a nucleic acid sequence as claimed in claim 1.
3. An amino acid sequence as claimed in claim 2, encoded by the sequence depicted in SEQ ID NO: 1.
4. A nucleic acid construct comprising a nucleic acid sequence as claimed in claim 1, the nucleic acid sequence being linked to one or more regulatory signals.
5. A vector comprising a nucleic acid sequence as claimed in claim 1 or a nucleic acid construct as claimed in claim 4.
6. A microorganism comprising at least one nucleic acid sequence as claimed in claim 1 or at least one nucleic acid construct as claimed in claim 4.
7. A microorganism as claimed in claim 6, where the microorganism is a bacterium of the genera Escherichia, Pseudomonas or Alcaligenes.
8. A process for preparing chiral carboxylic acids of the general formula I



5

which comprises converting racemic nitriles of the general formula II

10



15

in the presence of an amino acid sequence as claimed in claim 2 or 3 or a growing, dormant or disrupted microorganism as claimed in claim 6 or 7, and where at least 25 mmol of nitrile are converted per h and per mg of protein, or 25 mmol of nitrile are converted per h and per g of dry weight, into the chiral carboxylic acids,

20

where the substituents and variables in the formulae I and II have the following meanings:

25

\* an optically active center

30

$\text{R}^1$ ,  $\text{R}^2$ ,  $\text{R}^3$  independently of one another hydrogen, substituted or unsubstituted, branched or unbranched  $\text{C}_1$ - $\text{C}_{10}$ -alkyl,  $\text{C}_2$ - $\text{C}_{10}$ -alkenyl, substituted or unsubstituted aryl, hetaryl,  $\text{OR}^4$  or  $\text{NR}^4\text{R}^5$  and where the radicals  $\text{R}^1$ ,  $\text{R}^2$  and  $\text{R}^3$  are always different,

35

$\text{R}^4$  hydrogen, substituted or unsubstituted, branched or unbranched  $\text{C}_1$ - $\text{C}_{10}$ -alkyl,  $\text{C}_2$ - $\text{C}_{10}$ -alkenyl,  $\text{C}_1$ - $\text{C}_{10}$ -alkylcarbonyl,  $\text{C}_2$ - $\text{C}_{10}$ -alkenylcarbonyl, aryl, arylcarbonyl, hetaryl or hetarylcarbonyl,

40

$\text{R}^5$  hydrogen, substituted or unsubstituted, branched or unbranched  $\text{C}_1$ - $\text{C}_{10}$ -alkyl,  $\text{C}_2$ - $\text{C}_{10}$ -alkenyl, aryl or hetaryl.

9. A process as claimed in claim 8, wherein one of the substituents  $\text{R}^1$ ,  $\text{R}^2$  or  $\text{R}^3$  is  $\text{OR}^4$ .

45

10. A process as claimed in claim 8 or 9, wherein one of the substituents  $\text{R}^1$ ,  $\text{R}^2$  or  $\text{R}^3$  is aryl.

105040-92890860

11. A process as claimed in any of claims 8 to 10, wherein the process is carried out in an aqueous reaction solution at a pH between 4 to [sic] 11.
- 5 12. A process as claimed in any of claims 8 to 11, wherein from 0.01 to 10% by weight of nitrile or from 0.01 to 10% by weight of a corresponding aldehyde or ketone and from 0.01 to 10% by weight of hydrocyanic acid are reacted in the process.
- 10 13. A process as claimed in any of claims 8 to 12, wherein the process is carried out at a temperature between 0°C to [sic] 80°C.
- 15 14. A process as claimed in any of claims 8 to 13, wherein the chiral carboxylic acid is isolated from the reaction solution in yields of from 60 to 100% by extraction or crystallization or extraction and crystallization.
- 20 15. A process as claimed in any of claims 8 to 14, wherein the chiral carboxylic acid has an optical purity of at least 90%ee.

FOI b6 b7C - 92890860

25

30

35

40

45